NEC

HIGH CMR, 10 Mbps TOTEM POLE OUTPUT TYPE 5-PIN SOP PHOTOCOUPLER

PS9715

FEATURES

- **HIGH COMMON MODE TRANSIENT IMMUNITY**
  CM_H, CM_L = ±20 kV/μs TYP
- **SMALL AND THIN PACKAGE**
  5-pin SOP
- **HIGH SPEED**
  10 Mbps
- **PULSE WIDTH DISTORTION**
  $|t_{PHL} - t_{PLH}|$ = 7 ns TYP
- **HIGH ISOLATION VOLTAGE**
  BV = 2500 $V_{r.m.s.}$
- **TOTEM POLE OUTPUT**
  No pull-up resistor required
- **AVAILABLE IN TAPE AND REEL**
  PS9715-F3, F4: 3500 pcs/reel

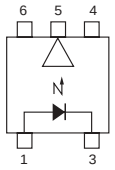
DESCRIPTION

PS9715 is an optically coupled high-speed, totem pole output isolator containing a GaAlAs LED on the light emitting side (input side) and a photodiode and a signal processing circuit on the light receiving side (output side) on one chip.

APPLICATIONS

- **LAN/FA**
- **MEASUREMENT EQUIPMENT**
- **PDP**

PS9715



ELECTRICAL CHARACTERISTICS (T_A = 0 to +85°C, Unless otherwise specified)

PART NUMBER				PS9715		
	SYMBOL	PARAMETERS	UNITS	MIN	TYP[1]	MAX
Diode	V_F	Forward Voltage, I_F = 10 mA, T_A = 25°C	V	1.4	1.65	1.9
	I_R	Reverse Current, V_R = 3 V, T_A = 25°C	μA			10
	C_t	Capacitance, V = 0, f = 1 MHz, T_A = 25°C	pF		30	
Detector	I_{OH}	High Level Output Current[2] V_{CC} = V_O = 5.5 V, V_F = 0.8 V	μA		0.003	200
	V_{OH}	High Level Output Voltage V_{CC} = 4.5 V, I_F = 250 μA, I_{OH} = -2 mA	V	2.4	3.0	
	V_{OL}	Low Level Output Voltage V_{CC} = 4.5 V, V_F = 0.8 V, I_{OL} = 8 mA	V		0.25	0.6
	I_{CCH}	High Level Supply Current, V_{CC} = 5.5 V, I_F = 0 mA	mA		12	17
	I_{CCL}	Low Level Supply Current, V_{CC} = 5.5 V, I_F = 10 mA	mA		13	18
	I_{OSH}	High Level Output Short Circuit Current, V_{CC} = 5.5 V, V_O = GND I_F = 0 mA, 10 ms or less	mA		-26	
	I_{OSL}	Low Level Output Short Circuit Current, V_{CC} = 5.5 V, V_O = GND I_F = 8 mA, 10 ms or less	mA		34	
Coupled	I_{FHL}	Threshhold Input Current, High → Low, V_{CC} = 5 V, T_A = 25°C	mA		2.3	5
						6
	R_{I-O}	Isolation Resistance, V_{I-O} = 1 k V_{DC}, RH = 40 to 60%, T_A = 25°C	Ω	10^{11}		
	C_{I-O}	Isolation Capacitance, V = 0, f = 1 MHz, T_A = 25°C	pF		0.4	
	t_{PHL}	Propagation Delay Time[1], High → Low, T_A = 25°C V_{CC} = 5 V, I_F = 7.5 mA	ns	15	33	65
				10		85
	t_{PLH}	Propagation Delay Time[1], Low → High, T_A = 25°C V_{CC} = 5 V, I_F = 7.5 mA	ns	15	40	65
				10		85

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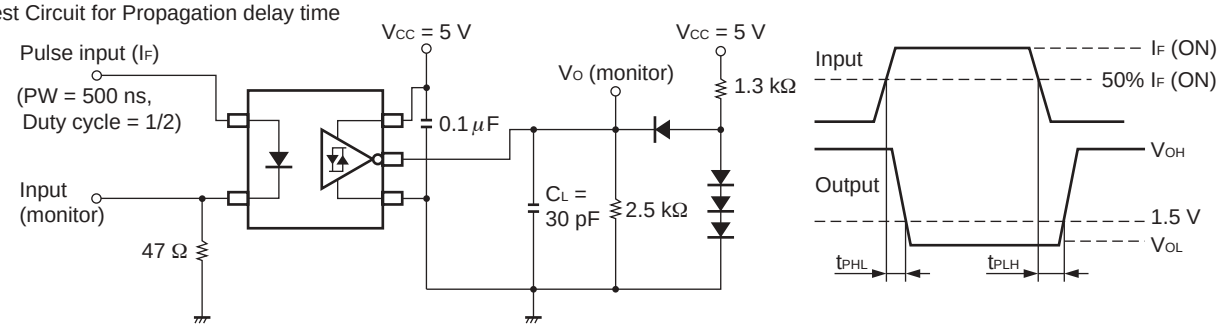
ELECTRICAL CHARACTERISTICS (T_A = 0 to +85°C, Unless otherwise specified), Continued

		PART NUMBER		PS9715		
	SYMBOL	PARAMETERS	UNITS	MIN	TYP	MAX
Coupled	$\lvert t_{PHL} - t_{PLH} \rvert$	Pulse Width Distortion, (PWD)[3], V_{CC} = 5 V, I_F = 7.5 mA	ns		7	50
	CM_H	Common Mode Transient Immunity at High Level Output[4], V_{CC} = 5 V, T_A = 25°C, I_F = 0 mA, $V_{O\ (MIN)}$ = 2 V, V_{CM} = 1 kV	kV/μs	10	20	
	CM_L	Common Mode Transient Immunity at Low Level Output[4], V_{CC} = 5 V, T_A = 25°C, I_F = 7.5 mA, $V_{O\ (MAX)}$ = 0.8 V, V_{CM} = 1 kV	kV/μs	10	20	

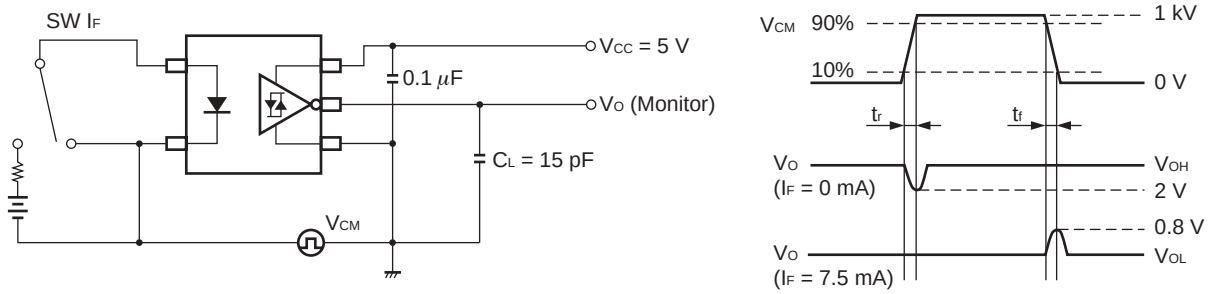
Notes:

1. Typical values at T_A = 25°C.
2. Because a high level output current (I_{OH}) of 300 μA or more may be output when the temperature is 0°C or less and when V_{CC} is around 3 to 4 V, it is important to confirm the characteristics (operation with the power supply on and off) during design, before using the device.
3. Test Circuit for Propagation delay time



C_L includes probe and stray wiring capacitance.

4.Test Circuit for common mode transient immunity



C_L includes probe and stray wiring capacitance.

USAGE CAUTIONS

1. This device is ESD sensitive.
2. Bypass capacitor of more than 0.1 μF is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capactor is no more than 10 mm.

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
Diode			
I_F	Forward Current	mA	30
V_R	Reverse Voltage	V	5
Detector			
V_{CC}	Supply Voltage	V	7
V_O	Output Voltage	V	7
I_{OH}	High level Output Current[2]	mA	-5
I_{OL}	Low level Output Current[2]	mA	13
P_C	Power Dissipation[2,3]	mW	130
Coupled			
BV	Isolation Voltage[4]	$V_{r.m.s.}$	2500
T_{OP}	Operating Temperature	°C	-40 to +85
T_{STG}	Storage Temperature	°C	-55 to +125

Notes:

1. Operation in excess of any one of these parameters may result in permanent damage.
2. T_A = -40 to +85°C, Applies to output pin Vo and power supply pin V_{CC}.

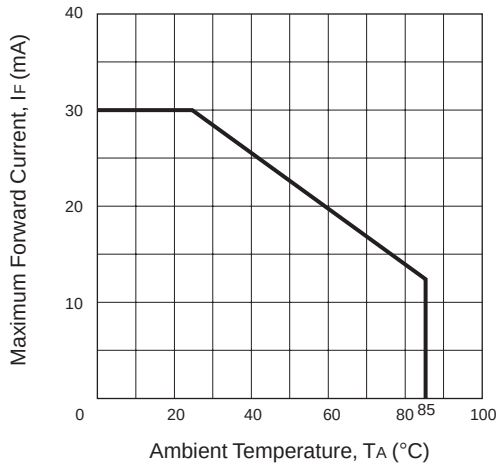
RECOMMENDED OPERATING CONDITIONS

PART NUMBER			PS9715		
SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
I_{FH}	High Level Input Current	mA	7.5		12.5
I_{FL}	Low Level Input Current	μA	0		250
V_{CC}	Supply Voltage	V	4.5	5.0	5.5
N	TTL(loads)				3
T_A	Operating Temperature	°C	0		+85

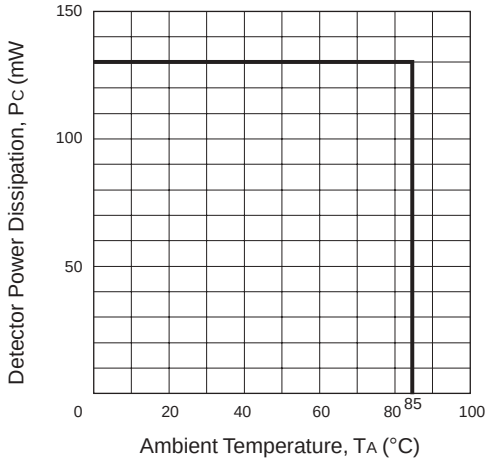
4. AC voltage for 1 minute at T_A = 25 °C, RH = 60% between input and output.

TYPICAL PERFORMANCE CURVES (TA = 25°C)

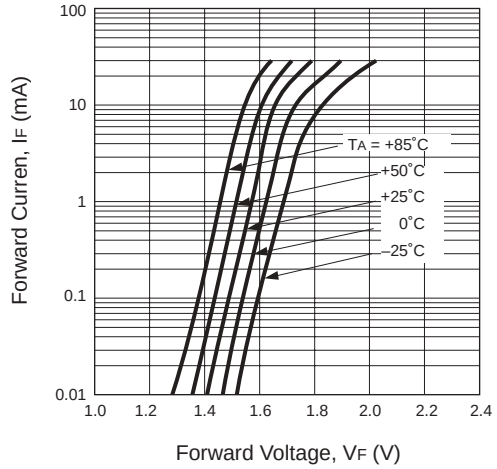
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



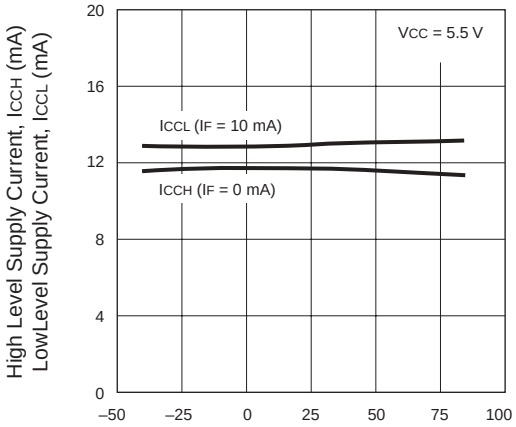
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



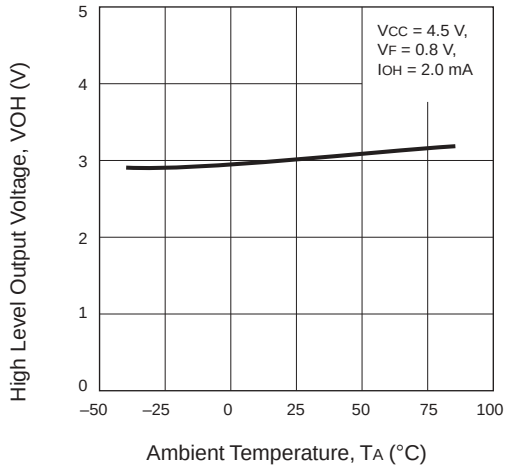
FORWARD CURRENT vs. FORWARD VOLTAGE



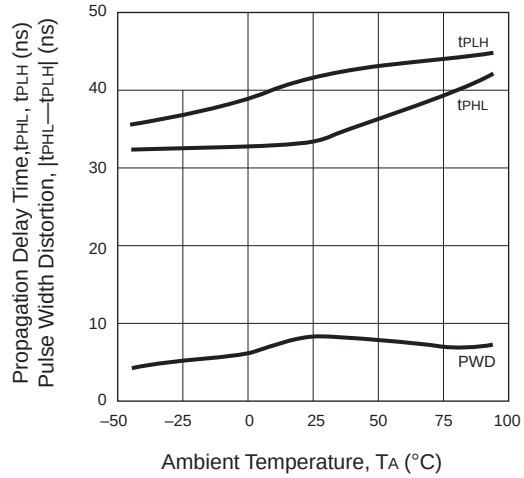
SUPPLY CURRENT vs. AMBIENT TEMPERATURE



HIGH LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE

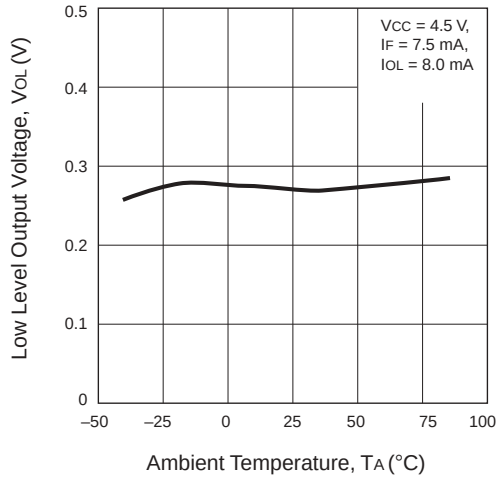


PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. AMBIENT TEMPERATURE

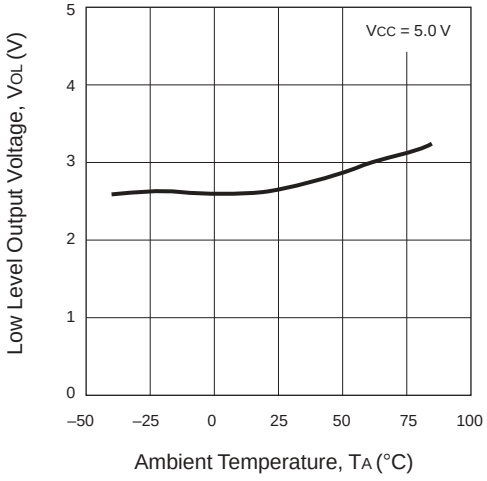


TYPICAL PERFORMANCE CURVES (TA = 25°C)

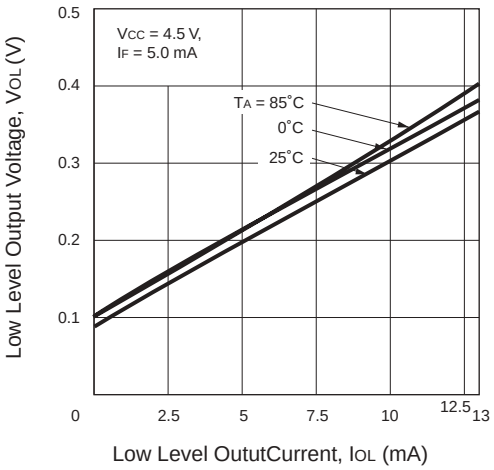
LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



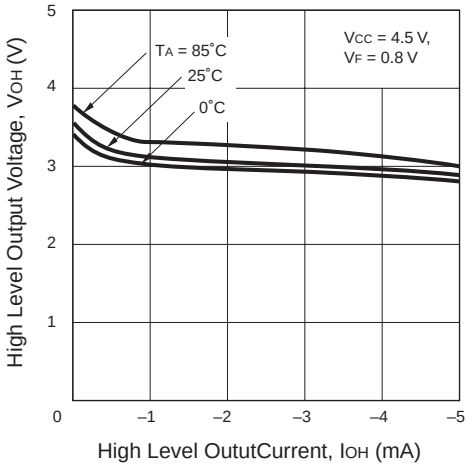
LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



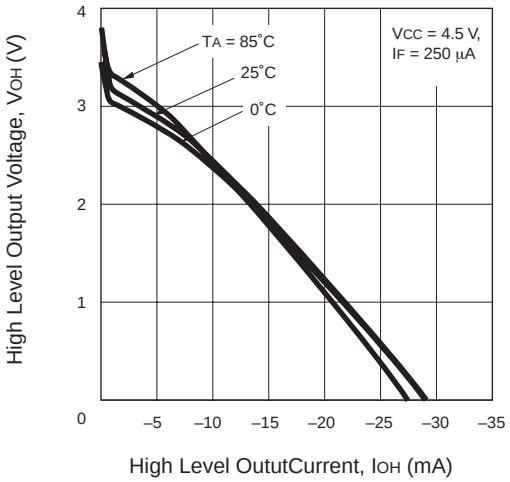
LOW LEVEL OUTPUT VOLTAGE vs. LOW LEVEL OUTPUT CURRENT



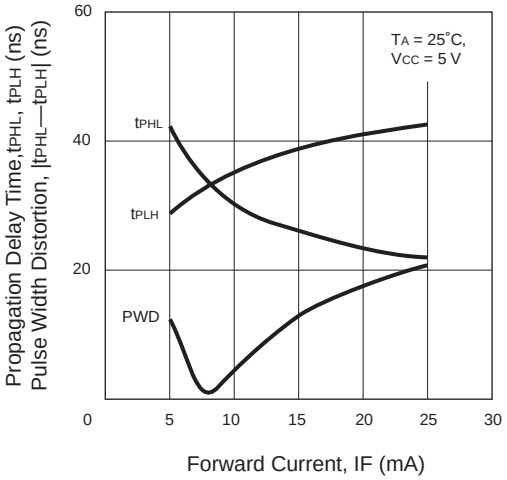
HIGHLEVEL OUTPUT VOLTAGE vs. HIGHLEVEL OUTPUT CURRENT



HIGH LEVEL OUTPUT VOLTAGE vs. HIGH LEVEL OUTPUT CURRENT

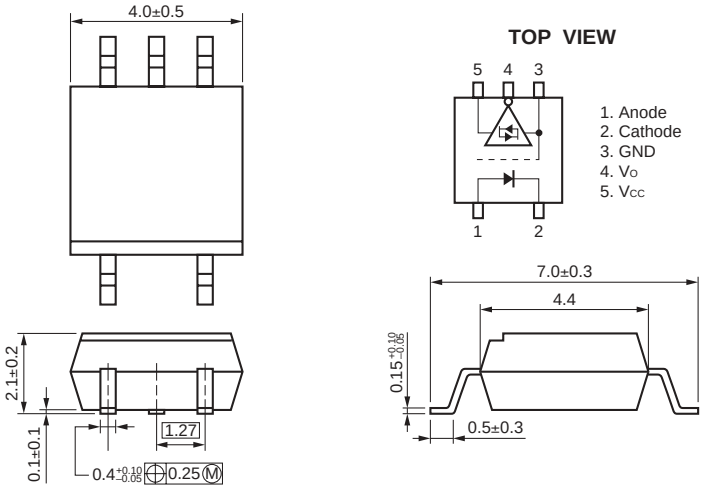


PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. FORWARD CURRENT

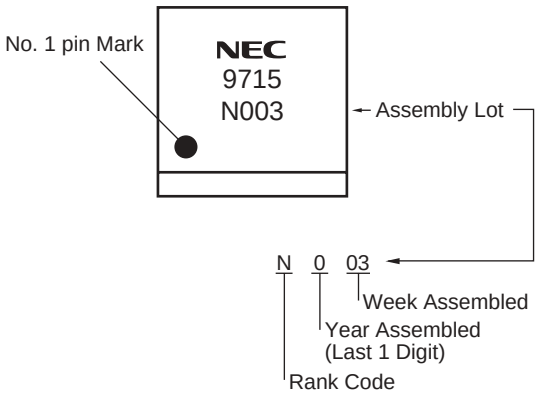


OUTLINE DIMENSIONS (Units in mm)

PS9715

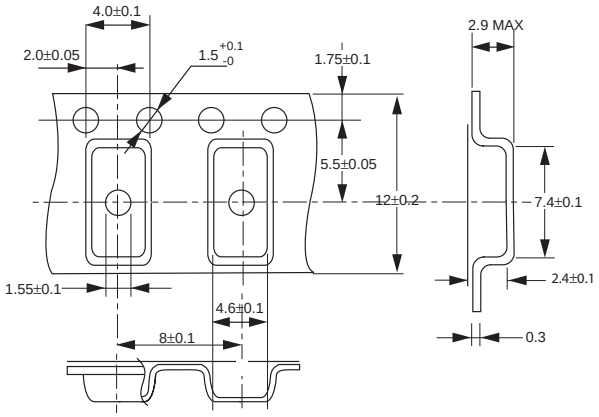


MARKING

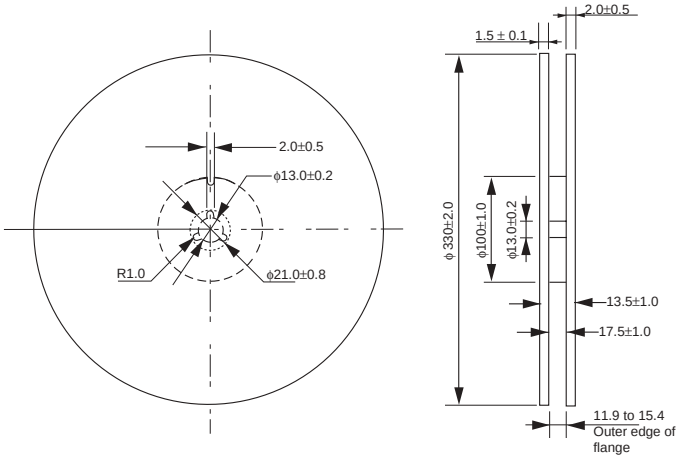


TAPING SPECIFICATIONS (Units in mm)

TAPE OUTLINE AND DIMENSIONS



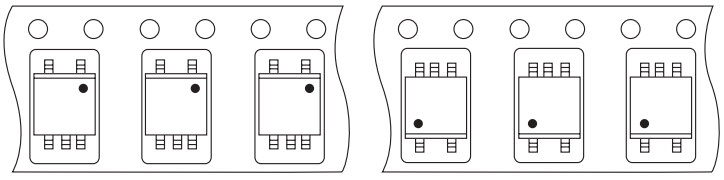
REEL OUTLINE AND DIMENSIONS



Packing : 3500 pcs/reel

TAPE DIRECTION

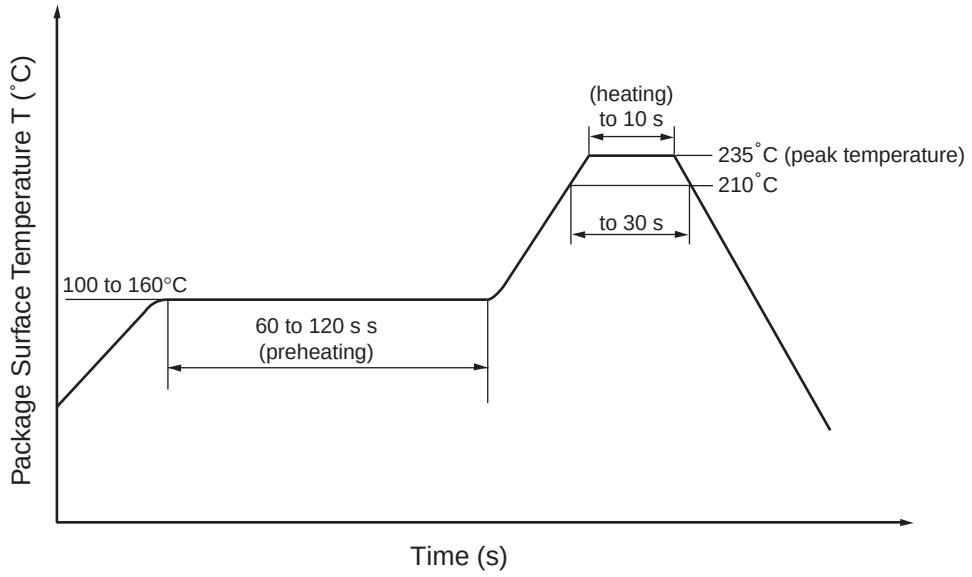
PS9715-F3 **PS9715-F4**



RECOMMENDED SOLDERING CONDITIONS

(1) Infrared reflow soldering

• Peak reflow temperature	235˚C or below (package surface temperature)
• Time of temperature higher than 210 ºC	30 seconds or less
• Number of reflows	Three
• Flux	Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)



(3) Cautions

• Fluxes
Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.